

## Chapter 3 — Background on the Region's Environment

This chapter serves to explain the past and current state of the environment of the proposed NHA, particularly so that readers who are unfamiliar with the region have a better understanding of the Delta as an evolving place and the context of the area which may influence opportunities and constraints for a Delta NHA.

### Landscape History of the Delta and its role in the National Story

The Delta is a place of great economic, environmental, historical, and cultural significance. Due to its unique geography and location, the rich natural resources which it is home to, and the point in time in which it was 'discovered', the story of the Delta is unparalleled to anywhere else in the nation in regards to how humans have transformed a vast region of natural wetlands into a constructed system of waterways, levees, and farmlands, which play an integral role in supporting the ninth largest economy of the world.

The Delta is formed where the two largest rivers within the State of California meet, the south flowing Sacramento River and the northbound San Joaquin River. The two rivers merge with smaller tributaries and tidal flows to form a unique inland Delta consisting of 1,000+ miles of sloughs and waterways. The Delta, along with the Suisun Marsh, Carquinez Strait, and San Francisco Bay, make up the largest estuary on the West Coast of the Americas. The Delta watershed encompasses 45 percent of the state's surface area stretching from the eastern slopes of the Coastal Ranges to the western slopes of the Sierra Nevadas.

The pre-reclamation Delta and Suisun Marsh ecosystem was once one of the most biologically productive and diverse ecosystems on the West Coast. The confluence of the two rivers formed a system of freshwater and brackish marshes from which spread a variety of habitat types: grasslands, seasonal wetlands, oak-woodland savannah, chaparral and riparian habitats. Rich peat soils which dominated the Delta landscape had been formed from centuries of tule and bulrush decay. Natural levees bordered the Delta waterways which were vegetated with oaks, sycamores, walnuts, willows, and more. The region was incredibly rich with a diversity of wildlife prior to human alteration.

The Delta was 'discovered' during the Gold Rush era (1848-1855) as the Delta waterways were vital transportation corridors for miners traveling from San Francisco to the mining districts in the Sierra Nevadas. Using the rivers reduced travel time between San Francisco and Sacramento from a typical two to three week trip on land to just under seven days on the rivers. As a result of the increase in visitors to the region, more people became aware of the Delta's soils which were deemed prime for farming. This led to the Delta becoming home to California's second 'gold rush' and by 1860,

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gold miners found a more stable and reliable fortune tilling the rich peatlands which became some of the most productive agricultural soils in the world. The Swamp and Overflow Land Act (1850) encouraged the reclamation of swampland and soon settlers began draining and reclaiming the Delta marsh. The reclaimed lands were subject to constant flooding, and through the use of Chinese immigrant laborers, farmers began building the first set of levees to hold back the flood waters.

New techniques and important technologies were developed for hydraulic engineering of the Delta which not only were integral to transforming the region from marshland to farmland, but also introduced the world to a new system of dredging. In the late 1870s, the clamshell dredge was invented and soon replaced manual labor in levee development. These steam powered dredges revolutionized levee construction by dredging deep cuts into the river bed to allow for higher, stronger levees. The reclamation period lasted until the 1930s, and by then the Delta was no longer a system of wetlands, but rather a complex system of levees, farmlands, and waterways, which was all accomplished by local landowners.

Agriculture flourished in the Delta due to the highly productive soils and readily available water supply. A large diversity and quantity of crops were produced for local consumption, as well as shipment throughout the world. Numerous specialty crops were produced in the Delta, including Bartlett Pears (about 50 percent of the world's supply was grown in the Delta region around World War I) and asparagus (about 90 percent of the world's supply was grown in the Delta in the early 1900s). As a leading food supplier for the world, the Delta was also an innovative center for agricultural equipment development, and notable inventions include a sugar beet harvester, the asparagus ripper, the asparagus plow and numerous other plows, discs, cultivators, and more. Additionally, the Caterpillar Tractor was developed in the Delta in the early 1900s. Previous tractor models had wheels which were constantly getting stuck in the peaty Delta soils. The Caterpillar Tractor alleviated this problem by running on tracks. This technology is now used throughout the world for agriculture, construction, military, and other applications.

By the late 1850s communities started developing along the banks of the Sacramento River, serving the early farmers and settlers in the area. The towns became agricultural shipping centers and river boat stops, linking the Delta to the rest of the world by shipping freight from the Delta, and supplying Delta residents with food, clothing, and other goods necessary for survival. Two Deep Water Ship Channels were also developed through dredging, the Sacramento Deep Water Ship Channel and the Stockton Deep Water Ship Channel, which transverse the Delta to export agricultural goods produced in the Central Valley from the cities of Sacramento and Stockton, respectively. Utilizing

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the Delta waterways for commerce was of great significance for much of the Central Valley, enabling the development of communities all the way from Redding in the north and Bakersfield in the south; to San Francisco in the west to the Sierra Nevada Foothills in the east.

In 1921, the California State Legislature authorized the development for a state water plan. In 1933, California voters approved the Central Valley Project (CVP), authorizing construction of reservoirs and provide a water barrier to repel seawater intrusion. The CVP was authorized for flood control and navigation, water supply for agriculture and municipal water uses, and hydroelectric power generation. In 1951, California authorized the State Water Project (SWP) to supply water to Southern California's expanding population. The SWP is the world's largest publicly funded water and power development and conveyance system. The CVP and SWP are linked to the Clifton Court Forebay which pumps water into the California Aqueduct and the Delta-Mendota Canal which serve California's highest population centers; the North Bay Area, Silicon Valley, Southern California, and to the Nation's largest agricultural economy, the San Joaquin Valley.

The center of the Delta's story is that of a young nation encouraging the reclamation of swampland to create some of the world's most productive farmlands in the center of California, from which spawned innovations, technologies, and infrastructure unique to the development of the State, as well as other parts of the nation and world. The Delta today is a complex assemblage of resources (natural, cultural, historical, agricultural, economic, recreational, and more) that make a significant contribution to the California's quality of life and economy. The region can be understood as the combination of land and water and the interactions of goods and people reflecting the historical, cultural, and economic diversity of the region. The rich and fertile soil nourishes the cornucopia; and the maze of levees, sloughs and waterways serve as a recreational playground for boaters and fishermen while providing flood protection to the urban areas surrounding the Delta. While the Delta is no longer the natural system of wetlands which it once was, it still remains an ecological gem for wildlife; as waterfowl have adapted to using the farmlands as habitat, and anadromous fish still travel its waterways between the Pacific Ocean and the Sierra Nevadas. The Delta is the heart of California's largest water delivery system and provides a portion of the water for 25 million residents, the State's \$1.7 trillion economy, and more than 3 million acres of productive farmland. What was once a largely uninhabited wetland system in the center of California was shaped, altered, and engineered through human labor and technologies; enabling people to utilize its precious natural resources in ways that are unmatched anywhere else in the world.

### Natural Resources and Special Status Species

#### **Sacramento-San Joaquin Delta**

The Delta represents the connection and confluence of a vast watershed, linking inland streams and rivers originating from the Cascade, Coastal, and Sierra Nevada ranges with the San Francisco Bay and Pacific Ocean. Approximately 40 percent of California's land area and 50 percent of its total stream flow converges at the Delta.

The ecosystem of the Delta was historically very rich, supporting abundant populations of wildlife and fish. However, native wildlife have been impacted by significant changes to the ecosystem over the past 150 years, including loss of habitat, loss of access to upstream habitat from dam construction, diking and draining for reclamation, urbanization, changes in flows, invasive species, pollutants, export pumping, and more. Large mammals such as bear and elk, which historically lived in and around the Delta have either been eliminated or reduced to extremely low numbers. In recent years, pelagic fish populations, such as Delta smelt, have declined to record low levels. Salmon runs have also experienced significant declines in the Delta.

Despite the large scale changes, a number of different habitat types are still found throughout the Delta including: intertidal wetlands, rivers, sloughs, riparian woodlands, scrub, non-tidal wetlands, grasslands, floodplains, and seasonal wetlands. With management practices such as seasonal flooding, Delta farmlands also serve as valuable habitat, particularly for waterfowl and shorebirds. Overall the Delta supports hundreds of species of flora and fauna, including special status species such as:

- Salt Marsh Harvest Mouse, Suisun Shrew, Townsend's Big-Eared Bat, San Joaquin Kit Fox, and Hoary Bat
- Black Rail, Great Blue Heron, Snowy Egret, Sandhill Crane, Song Sparrow, Swainson's Hawk, and Burrowing Owl
- Giant Garter Snake and Western Pond Turtle
- Chinook Salmon, Steelhead, Green Sturgeon, Delta Smelt, and Sacramento Splittail
- Elderberry Longhorn Beetle

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### Suisun Marsh

Suisun Marsh is the largest contiguous brackish water marsh remaining on the West Coast of North America and is a critical part of the Bay-Delta ecosystem. Approximately 200 miles of levees in the Marsh contribute to managing salinity in the Delta. The Marsh encompasses more than 10 percent of California's remaining natural wetlands and serves as the resting and feeding ground for thousands of birds migrating on the Pacific Flyway, and resident waterfowl. In addition, the Marsh provides important habitat for more than 221 bird species, 45 mammalian species, 16 reptile and amphibian species, and more than 40 fish species. Suisun Marsh supports the State's commercial salmon fishery by providing important tidal rearing areas for juvenile fish. Special status species include:

- Salt Marsh Harvest Mouse, Suisun Ornate Shrew, Harbor Seal
- California Black Rail, California Least Tern, California Brown Pelican, San Pablo Song Sparrow, Western Snowy Plover
- California Red-legged Frog, San Francisco Garter Snake, Northwestern Pond Turtle
- Coho Salmon, Green Sturgeon, Pacific Lamprey, River Lamprey, Tidewater Goby

### Carquinez Strait

The Carquinez Strait is the meeting point for freshwater draining from California's inland and saltwater from the Pacific Ocean. Freshwater flows westward through the Carquinez Strait, draining the Central Valley watersheds, including the Sacramento, San Joaquin, Feather, and American Rivers. Saltwater from the ocean flows in and out with the tide twice daily. The mixing of fresh and salt water creates a transition zone, or "null" zone, which is critical to the health of the region's ecosystem.

The Strait connects the San Francisco/San Pablo Bay with Suisun Bay and the Delta. It is half-a-mile wide, eight miles long, and in places over 800 feet deep from bluff-top to bedrock bottom. Due to seismic occurrences, the channel bends sharply to the right, then back left as it opens up into the broad triangular basin of Suisun Bay.

The Carquinez Strait area is situated in the Central Coast Floristic Region of the California Floristic Province. The relative stability of the climate makes the region one of the richer areas of endemic taxa in California. Several diverse plant communities are represented in the Carquinez Strait, including foothill and valley grasslands, oak/bay woodlands, central coastal scrub, northern coastal salt marsh,

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coastal brackish marsh, and coastal and valley freshwater marsh. Special status species include:

- Longtail Wessel, Salt Marsh Harvest Mouse, and Suisun Shrew
- American Peregrine Falcon, Salt Marsh Yellowthroat, Bald Eagle, California Gull, Salt Marsh Song Sparrow
- Delta Smelt, Sacramento Splittail, Longfin Smelt
- Suisun Thistle, Bird's Beak, Marsh Gumplant, California Hibiscus, and Delta Tule Pea

### Water

#### **Sacramento-San Joaquin**

In California, rainfall runoff and snowmelt are captured in reservoirs to redistribute to urban and agricultural users while meeting environmental requirements. About 75 percent of the State's water originates north of the Delta and about 67 percent of the State's water needs occur south of the Delta.

Because the Delta drains the Sacramento and San Joaquin River watersheds, urban stormwater runoff and waste discharges from upstream and adjacent areas enter Delta waterways and cause water quality problems. Low-flow years generally carry higher concentrations of waste discharges and agricultural runoff than do wet years.

Some treated municipal and industrial wastewater, untreated urban storm water, and agricultural runoff and drainage enter the Delta directly. Other urban and agricultural discharges from upstream in the watershed enter the Delta along with the river flows. Seepage onto Delta islands from adjacent channels and drainage from the agricultural lands are released back to the Delta channels at hundreds of locations.

The Central Valley Regional Water Quality Control Board has identified the Delta as impaired by a number of pollutants, including some pesticides, low dissolved oxygen, electrical conductivity (salinity), and mercury. Delta fish have elevated levels of methylmercury, which poses a risk to humans and wildlife that eat the fish on a regular basis.

The daily tidal cycles and the San Joaquin River contribute most of the salinity to the Delta. During periods of high Delta inflows, salinity is low; during periods of low Delta inflows, salinity rises. Salinity in the Delta is managed by a mix of releases from upstream reservoirs, Cross Channel gate

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operations, Delta outflow, and exports from the Delta. The Delta is governed by water quality standards for municipal and industrial uses, agricultural uses, and fish and wildlife, all of which are currently under review by the State Water Resources Control Board (SWRCB). The combination of organic matter (decaying vegetation), bromide in the seawater, and disinfectants used in water treatment plants, produce disinfection byproducts that may pose health risks.

The SWRCB and the Regional Boards designate beneficial uses of the State’s waters. In the Delta, beneficial uses include: municipal and domestic supply; agriculture; industry; groundwater recharge; navigation; recreation; wildlife habitat; fish migration and spawning; and preservation of rare and endangered species.

### **Suisun Marsh**

Delta water management for agriculture, water supply diversions, and exports; and the salinity of water diverted for waterfowl habitat in the Marsh; officially became linked in the 1978 State Water Board Delta Water Control Plan and the water right decision (D-1485) Suisun Marsh salinity standards. D-1485 required the Department of Water Resources (DWR) and the Bureau of Reclamation (Reclamation) to prepare a plan to protect the beneficial use of water for fish and wildlife and meet salinity standards for the Marsh. Initial facilities included improved Roaring River Distribution System facilities to supply approximately 5,000 acres on Simmons, Hammond, Van Sickle, Wheeler, and Grizzly Islands with lower salinity water from Montezuma Slough, and the Morrow Island Distribution System and Goodyear Slough outfall to improve supply of lower salinity water for the southwestern Marsh. These initial facilities were constructed in 1979 and 1980; the required Suisun Marsh Plan of Protection was prepared and approved in 1984.

SWP and CVP projects affect Suisun Marsh salinity by regulating Delta outflow through upstream reservoir storage and releases and Delta exports. D-1485 and the currently applicable D-1641 require DWR and Reclamation to meet various Delta outflow and salinity objectives in the Delta and the Marsh. These objectives limit the allowable exports during some periods of relatively low Delta inflows. The SWRCB suggested in D- 1485 that “full protection of Suisun Marsh now could be accomplished only by requiring up to 2 million acre-feet of freshwater outflow in dry and critical years in addition to that required to meet other standards”. This was strong motivation for DWR and Reclamation to prepare a plan of protection for Suisun Marsh that would use other facilities or management actions to provide appropriate salinity in the Marsh. The Suisun Marsh Salinity Control Gate on Montezuma Slough near Collinsville, which began operating in October 1988,



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were constructed by DWR and Reclamation to improve the salinity in the Marsh channels without requiring the additional Delta outflow that the State Water Board had anticipated.

### Carquinez Strait

Fresh river water flows westward through the Carquinez Strait, draining the Central Valley watersheds. River and ocean water generally meet and mix around the Carquinez Strait. Because freshwater is lighter than saltwater, the river water tends to float on top of the ocean water. Partial mixing of these waters creates a vertical salinity gradient that is greatest in the winter and in the wet years, when river flows are greater, and can extend for many miles through the estuary. This mixing zone is pushed by the tides up and down the estuary, two to six miles twice daily. Superimposed on this back-and-forth motion is a much smaller downstream flow of the freshwater surface layer, which induces an upstream return current of saltier water near the bottom. This pattern of net flow is known as estuarine or gravitational circulation. The region where the upstream and downstream currents meet and cancel out along the bottom is called the null zone.

### Land Use

#### Sacramento-San Joaquin Delta

The settlement pattern of the Delta was historically, and currently remains, closely associated with the Delta's waterways, as well as the configuration of agricultural lands. The Delta is no longer the vast marshland that it historically was and instead is an agriculturally dominated landscape with 1,100+ miles of levees enclosing 57 islands. Due to the rich peat soils, as well as mineral soils at higher locations, the Delta's farmlands are highly productive and well suited for ongoing agricultural operations.

The Delta's Primary Zone is a predominately rural landscape as it encompasses the locations where development proposals did not currently exist and where no general plans called for growth at the time the Delta Protection Act was developed in 1992. A handful of small, unincorporated towns are in the Primary Zone, along the Sacramento River, including Clarksburg, Courtland, Hood, Locke, Walnut Grove, and Ryde. These unincorporated towns, sometimes referred to as 'legacy communities' possess a rural charm with events, local businesses, and recreational opportunities that are attractive to visitors and locals alike. Rio Vista is located partially

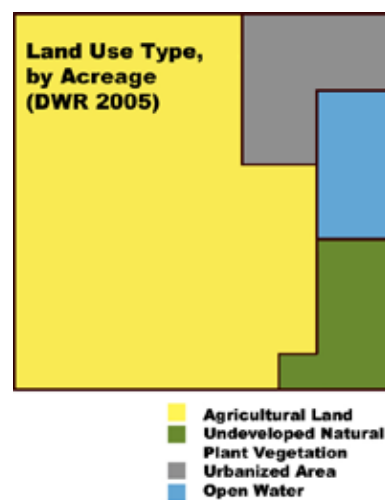


Figure 2. Delta Land Use<sup>1</sup>



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within the Primary Zone but not within the Secondary Zone. The Secondary Zone consists of land at the periphery of the Delta, and contains most of the Delta's urbanized land. One incorporated city, Isleton, and portions of other incorporated cities including Antioch, Elk Grove, Lathrop, Oakley, Pittsburg, Sacramento, Stockton, Tracy, and West Sacramento, are located within or just outside of the Secondary Zone. Current and future population growth increases the demand for developable land in much of the Secondary Zone due to it being near existing population centers of the Bay Area, Sacramento and Stockton. This demand results in the conversion of open space, primarily agricultural land, to residential and commercial uses which is yielding an increase in concern about the potential for urbanization and projects in the Secondary Zone to impact the Primary Zone.

Hundreds of miles of rivers and sloughs lace the region. These waterways provide habitat for many aquatic species and the uplands provide year-round and seasonal habitat for a wide variety of terrestrial species. Some agricultural lands also provide rich seasonal wildlife habitat as thousands of acres of agricultural lands are flooded after harvest and provide feeding and resting areas for resident and migratory birds and other wildlife. Sherman Island, Twitchell Island, Staten Island, portions of the Yolo Bypass (e.g., Vic Fazio Wildlife Area) and McCormack-Williamson Tract are held as conservation lands and are currently operated as farmlands. In addition, the levees are part of a system that protect Delta farmlands, legacy communities, critical infrastructure, and urban peripheries including Sacramento and Stockton.

### **Suisun Marsh**

The values of the Marsh have been recognized as important, and several agencies have been involved in its protection since the mid-1970s. In 1974 the Nejedly-Bagley-Z'Berg Suisun Marsh Preservation Act was enacted by the California Legislature to protect the Marsh from urban development. It required the California Department of Fish and Game (DFG) and the San Francisco Bay Conservation and Development Commission (BCDC) to develop a plan for the Marsh and called for various restrictions on development in the Marsh boundaries. In 1976, the BCDC developed the Suisun Marsh Protection Plan (SMPP), which defined and limited development within the primary and secondary management area for the "future of the wildlife values of the area as threatened by potential residential, commercial, and industrial development". The primary management area consists of tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands within the Marsh. The secondary management area comprises of upland grasslands and agricultural lands, which provide significant buffer habitat to the Marsh. The SMPP objectives are "to preserve and

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enhance the quality and diversity of the Suisun Marsh aquatic and wildlife habitats and to assure retention of upland areas adjacent to the Marsh in uses compatible with its protection”.

In 1977, the California Legislature implemented Assembly Bill 1717, the Suisun Marsh Preservation Act of 1977, which replaced the 1974 Act and called for the implementation of the SMPP; designated the BCDC as the state agency with jurisdiction over the Marsh; and called for the Suisun Resource Conservation District (SRCD) to have the primary local responsibility for water management on privately owned lands in the Marsh. In 1984, DWR with cooperation from SRCD, DFG, U.S. Department of the Interior, and Reclamation; published the Plan of Protection for Suisun Marsh, in response to the SWRCB Water Rights Decision 1485, Order 7. The Plan of Protection was a proposal for staged implementation of a combination of activities, including monitoring, a wetlands management program for landowners, physical facilities, and supplemental releases of SWP and CVP reservoirs.

Current land use in the Marsh is a mixture of privately and state-managed lands. Suisun Marsh has approximately 51,416 acres of managed seasonal wetlands. Most of the properties in the Marsh are privately owned duck and hunting clubs with some public recreation lands. Specifically, it is home to public waterfowl hunting areas managed by DFG (13,500 acres) and 158 private duck clubs (37,500 acres). Suisun Marsh is divided between the Primary Management Area and the Secondary Management Area. The Primary Management Area consists of tidal marshes, seasonal marshes, managed wetlands, and lowland grasslands within the Marsh. The intent is for this area to remain in its existing marsh and related uses as provided for in the SMPP. The Secondary Management Area comprises of upland grasslands and agricultural lands, which provide significant buffer habitat for the Marsh. Within this area agricultural practices favoring wildlife use and habitat enhancement are encouraged.

### **Carquinez Strait**

In the 1840s, Mexico divided the region into large land grants. Rancho Canada del Hambre, granted to Teodora de Soto in 1842, included the shoreline from Crockett to near Martinez. To the east, south and west was Rancho El Pinole, granted to Ygnacio Martinez, the Commandant of the Presidio in San Francisco, in 1823. Rancho El Pinole included the present site of Martinez west of Alhambra Creek, as well as the southeastern shore of San Pablo Bay from Crockett to Point Pinole. On the other side of the Strait, Rancho Suscol which included the future sites of both Vallejo and Benicia was granted to General Mariano Vallejo in 1844. The grantees used the land mainly to graze

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large herds of livestock which were gathered in communal rounds-ups near the bayshore, an activity for which the town of Rodeo was later named.

An influx of entrepreneurs into the Carquinez Strait region began with the onset of the Gold Rush in 1848, the end of the Mexican-American War and the admission of California to the United States in 1850. Capitalizing on the litigious outcome of the Land Act of 1851, requiring Californiaos to prove up their claims, the newcomers bought or confiscated land from the grantees, or married into it. With great energy, between 1849 and 1892, the towns of Benicia, Vallejo, Martinez, Crockett, Port Costa, Rodeo and Hercules were founded and platted along the shore of the Bay of the Strait.

Land use in the Strait region ranges from large tracts of open space to dense urban and industrial developments along the waterfront. A number of medium to high density waterfront communities occur along the Strait, including Vallejo, Martinez, Benicia, Crockett, and Port Costa. Many industrial developments can also be found along the Strait, including four of California's twelve largest oil refineries – Shell, Tosco, Exxon, and Unocal. Other large industrial sites include the C & H Sugar Refinery and the Energy National cogeneration plant, both in Crockett. The region also has many areas of open space developed for tourism and recreation, including a variety of municipal parks, state recreation areas, and regional shorelines.

Maritime-related activities include commercial shipping, as well as ships bound to or returning from ports in Sacramento, Stockton, and the Pittsburg/Antioch areas. Naval vessels also pass though the Strait going to and from the Concord Naval Weapons Station. Municipal wharfs and commercial terminals line both sides of the Strait, serving largely to facilitate the handling of dry bulk goods and petroleum products.

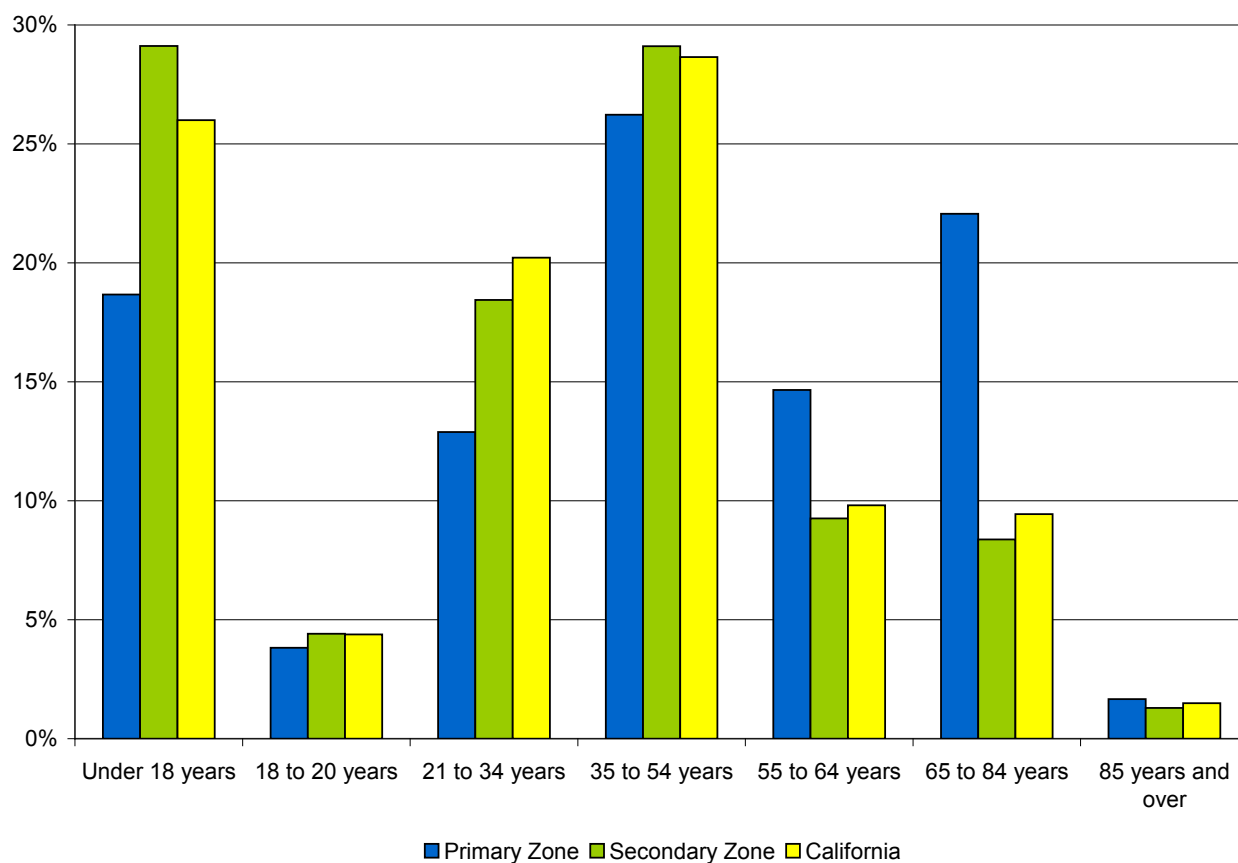
### Population

#### **Sacramento-San Joaquin Delta**

The Legal Delta has experienced rapid population growth, increasing by about 54 percent since 1990, compared to 25 percent statewide. This high growth rate is partially from rapid urbanization due to the Delta's position in the midst of large metropolitan areas in Northern California. The majority of this population growth occurs in the Secondary Zone, with the highest concentrations being in Antioch and Pittsburg to the west, Stockton and Tracy to the southeast and Sacramento and West Sacramento to the north. As the Primary Zone is mainly undeveloped land, its population density is low and generally centered around the legacy communities. Its population has remained relatively

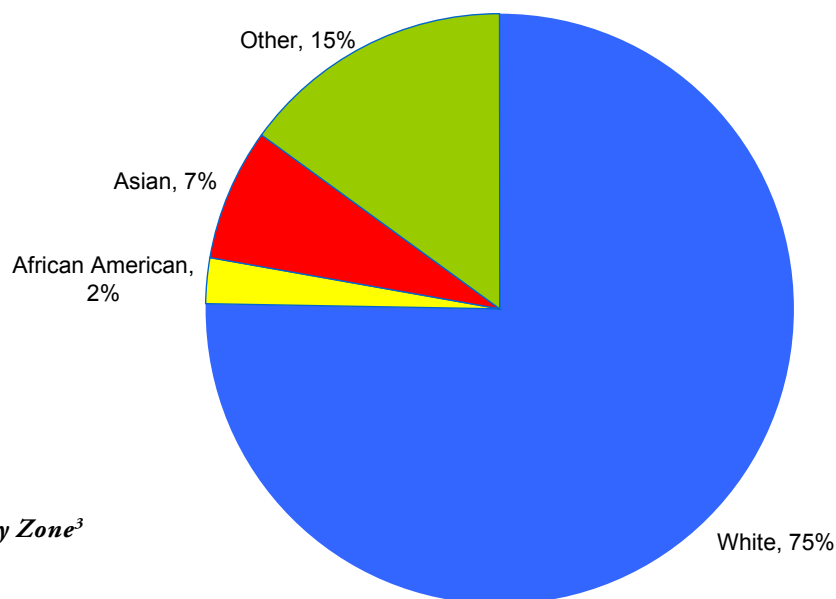
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stable over recent years and was about 12,000 in 2010, roughly the same as in 1990. The following four charts illustrate the composition of age, race, and annual income of the Delta’s population.

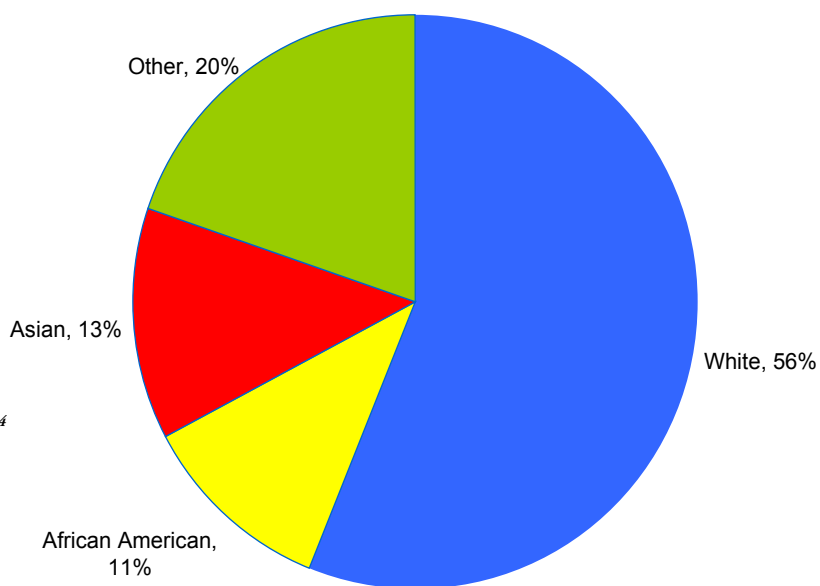


**Figure 3. Age Distribution in the Delta<sup>2</sup>**

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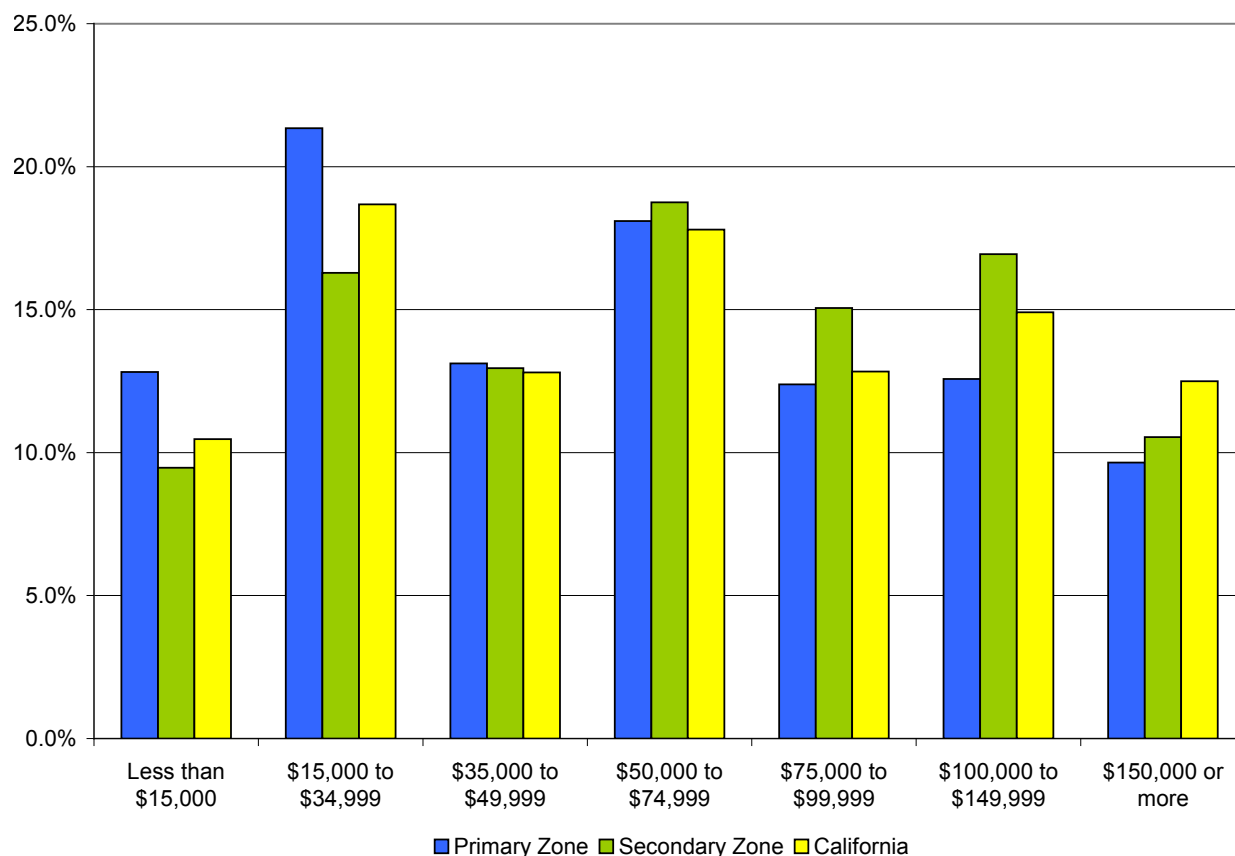
*Figure 4. Race in the Primary Zone<sup>3</sup>*



*Figure 5. Race in the Secondary Zone<sup>4</sup>*

Across all race categories approximately 26 percent of the Primary Zone population and 30 percent of the Secondary Zone population reported being of Hispanic origin.

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**Figure 6. Income Distribution in the Delta<sup>5</sup>**

### Suisun Marsh

The Suisun Marsh is located within the Suisun City zip code 94585. In 2010, the US Census Bureau estimated the 94585 population at 49,163. The urban population is centered on Suisun City, Rockville, and parts of Fairfield with a population of 35,226. While no urban development exists within the Marsh itself, the DFG Grizzly Island Wildlife Area Complex (comprising more than 15,000 acres of publicly owned lands), includes local residents, families, homes, and private structures protected by a levee system.

### Carquinez Strait

Current pattern of suburbanization in the region began in the 1940s and has been on relative par with the rest of the Bay Area. A number of early factors have contributed to the local growth including, expansion of Bay Area communities, population pressure during World War II, increases in income during the war years, the universal use of the automobile, and the Californian ideal of suburban living. The 2010 Census estimated the Strait's population at 182,045, with population

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numbers contributing from the community areas of Vallejo, Martinez, Benicia, Crockett, and Port Costa. The 2010 population is almost equal, except for a slight decline, to the area's 2000 population of 182,917.

### Business and Industry

#### **Sacramento-San Joaquin Delta**

The Delta's cultural, recreational, natural resource, and agricultural values are inextricably linked to economic activities that are carried out in the Delta. Therefore, maintaining a healthy economy that supports these activities within the Delta is critical to protecting these values.

As an economic place, the Delta is dependent upon agriculture, with recreation and tourism also being important economic drivers. It is estimated that Delta crop and animal production has an economic impact of roughly 9,700 jobs, \$683 million in value added, and \$1.4 billion in output in the five Delta counties. Across all of California, the economic impact of Delta agriculture is approximately 13,000 jobs, \$819 million in value added, and \$1.6 billion in output. When related value-added manufacturing such as wineries, canneries, and dairy products are included with the impact of Delta agriculture, the total economic impact of Delta agriculture is roughly 13,200 jobs, \$1.059 billion in value-added, and \$2.647 billion in economic output in the five Delta counties. Including value-added manufacturing, the statewide impact of Delta agriculture is about 25,000 jobs, \$2.135 billion in value-added, and \$5.372 billion in economic output.

Recreation is an integral part of the Delta economy, generating roughly 12 million visitor days of use annually and approximately \$250 million dollars of visitor spending in the Delta each year. Of the roughly 12 million visitor days spent in the Delta each year, approximately 8 million days are for resource-related activities (e.g., boating and fishing), 2 million days are for right-of-way related and tourism activities (e.g., bicycling and driving for pleasure), and 2 million days are for urban parks-related activities (e.g., picnicking and organized sports). Boating and fishing have the biggest economic impact, and are estimated to generate nearly 80 percent of the recreation and tourism spending in the Delta, including significant expenditures on lodging, meals, supplies, marina services, and fuel. Delta recreation and tourism supports over 3,000 jobs in the five Delta counties. These jobs provide over \$100 million in labor income and over \$175 million in value added to the regional economy. Across all of California, Delta recreation and tourism supports over 5,300 jobs, and contributes about \$353 million in value added.



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*The Delta's cultural, recreational, natural resource, and agricultural values are inextricably linked to economic activities that are carried out in the Delta. Therefore, maintaining a healthy economy that supports these activities within the Delta is critical to protecting these values.*



### **Suisun Marsh**

Existing land use in the Marsh is zoned as marsh and agriculture, both having a resource conservation overlay. The marsh designation provides for protection of wetland areas and permits aquatic and wildlife habitat, marsh-oriented recreational uses, compatible agricultural activities, and educational/scientific research. The agriculture designation provides areas for farming as the primary use, and allows secondary uses that support the economic viability of agriculture.

### **Carquinez Strait**

Today the characteristic industry of the Carquinez shore is oil refining. Early refineries were connected by pipelines to oil fields in the San Joaquin Valley. The refineries have since expanded in number and currently include terminals at Benicia, Martinez, Ozol, Crockett and Selby. These refineries provide 72 percent of the Bay Area's refining capacity and 58 percent of its storage capacity.

### Transportation and Infrastructure

#### **Sacramento – San Joaquin Delta**

Due to the Delta's location between major population areas, its unique resources (especially water and natural gas), its flat terrain, and general lack of development, the region has high value as a utility and transportation corridor. More than 500 miles of transmission lines and more than 60 substations lie within the Delta boundaries. Within the larger Delta-Suisun Marsh area are approximately 240 operating gas wells. Natural gas pipelines serve local gas fields and regional pipelines. PG&E's underground natural gas storage area under McDonald Island provides up to one-third of the peak natural gas supply for its service area. Pipelines carry gasoline and aviation fuel across the Delta from Bay Area refineries to depots in Sacramento and Stockton for distribution throughout Northern California and Nevada and provide approximately 50 percent of the transportation fuel used in that region. The Mokelumne Aqueduct, consisting of three pipelines, is the main municipal water conveyance facility for 1.3 million people in the East Bay Municipal Utility District. The aqueduct crosses five Delta islands/tracts (Orwood Tract, Woodward Island, Jones Tract, Roberts Island, and Sargent-Barnhart Tract) protected by levees. Additionally, the Sacramento and Stockton Deep Water Ship Channels both play crucial roles in the international import and export of goods.

Transportation systems traversing around and through the Delta include several railroads, freeways, state highways, and county roads. Additionally, three interstate freeways (Interstates 5, 80, and 580) provide major transportation and trucking routes that pass the periphery of the Delta. The three major state highways in the Delta (State Routes 4, 12, and 160) are typically two lanes, sometimes built on top of levees. Originally meant for lower traffic volumes at moderate speeds, the State highways are now heavily used for regional trucking, recreational access, and commuting. More than 50 bridges, including approximately 30 drawbridges, span the navigable channels.

#### **Suisun Marsh**

Many of the Marsh levees serve as important local transportation corridors and protect private and public infrastructure in addition to providing ecological and aesthetic value. Significant examples of public infrastructure protected by locally funded levee maintenance programs are the Union Pacific Railroad, Amtrak Capitol Corridor, the petroleum product pipeline to Travis Air Force Base, other petroleum pipelines, State Route 12, Solano County roads, natural gas production wells, electrical transmission lines, and water conveyance facilities.

## Chapter 3 — Background on the Region's Environment

### **Carquinez Strait**

Until 1927, the Strait could only be traversed by a series of ferries. In 1927, the Carquinez auto bridge between Vallejo and Crockett opened and the Carquinez Strait Bridge provided the final link in the Pan-American Highway, connecting Canada with Mexico. In 1958, to relieve congestion from Interstate 80, the California State Department of Transportation completed a parallel span 200 feet to the east. The bridge was recently succeeded by the Alfred Zampa Memorial Bridge which lies to the west of the former bridges.

Two other bridges of note connect Martinez with Benicia. When completed in 1930, the Southern Pacific Railroad Bridge was the longest and the heaviest double track bridge west of the Mississippi River and boasted a load carrying capacity greater than that of any bridge in the US. A parallel highway bridge carrying Interstate 680, the George Miller, Jr. Memorial Bridge, was complete on the downstream side of the Strait in 1962.

### **Data Sources**

<sup>1</sup>Department of Water Resources. "California Water Plan Update 2005." Volume 3. Chapter 12:2

<sup>2-5</sup>2005-9 American Community Survey, Census Bureau